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BEFORE THE ARIZONA CORPORATION COMMISSION

AZ CORP COMMISSION

2016 DEC 22 P 4:35

COMMISSIONERS

DOUG LITTLE - CHAIRMAN
BOB STUMP
BOB BURNS
TOM FORESE
ANDY TOBIN

IN THE MATTER OF THE APPLICATION OF
ARIZONA PUBLIC SERVICE COMPANY FOR
A HEARING TO DETERMINE THE FAIR
VALUE OF THE UTILITY PROPERTY OF THE
COMPANY FOR RATEMAKING PURPOSES,
TO FIX A JUST AND REASONABLE RATE OF
RETURN THEREON, TO APPROVE RATE
SCHEDULES DESIGNED TO DEVELOP SUCH
RETURN.

DOCKET NO. E-01345A-16-0036

IN THE MATTER OF FUEL AND PURCHASED
POWER PROCUREMENT AUDITS FOR
ARIZONA PUBLIC SERVICE COMPANY

DOCKET NO. E-01345A-16-0123

NOTICE OF FILING

REP America d/b/a/ ConservAmerica submits the Direct Testimony of Paul Walker.

RESPECTFULLY SUBMITTED this 22nd day of December 2016.

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By

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Arizona Corporation Commission

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DOCKET NO. E-01345A-16-0036

DOCKET NO. E-01345A-16-0123

Direct Testimony of Paul Walker

on Behalf of

ConservAmerica

December 22, 2016

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Exhibits:

- Exhibit 1: The Economist, “Curbing Climate Change: The Deepest Cuts”, September 2014
- Exhibit 2: U.S. Energy Information Administration, “Total energy subsidies decline since 2010, with changes in support across fuel types”, March 13, 2015

1 **I. Introduction.**

2
3 **Q. Please state your name and business address.**

4 A. My name is Paul Walker. My business address is 330 East Thomas Road, Phoenix,
5 Arizona 85012.
6

7 **Q. By whom are you employed and what is your position?**

8 A. I am the Executive Director of ConservAmerica, a national organization working on
9 energy, land, and water issues. I am also the founder, owner and President of Insight
10 Consulting, LLC, a regulatory consulting firm, although I am winding down my practice to
11 focus my efforts on ConservAmerica.
12

13 **Q. Please describe your education.**

14 A. I have a Master's Degree in Business Administration from the Thunderbird School of
15 Global Management. I have a Bachelor's Degree in Business Management from the
16 University of Phoenix. I am a graduate of numerous U.S. Army schools, including the
17 U.S. Army War College's Combined Arms and Service School, the U.S. Army Officer
18 Advanced Course (Transportation), and the U.S. Army Officer Basic Course (Military
19 Police).
20

21 **Q. Please describe your professional background and experience.**

22 A. From 2004 to present I have worked as a lobbyist and regulatory consultant for clients in
23 the utility and energy sectors. I worked with Wall Street investment firms from 2004 to
24 2009, conducting regulatory analysis of federal and state matters ranging from rate cases
25 in numerous states to evaluating liquefied natural gas export terminal feasibility. I have
26 worked with several Arizona utilities, including Arizona Public Service, Tucson Electric
27 Power, Arizona Water Company, Liberty Utilities, and Global Water Resources. Prior to

1 that, I served as advisor to Commissioner Marc Spitzer at the Arizona Corporation
2 Commission, and on Governor Jane Dee Hull's Indian Gaming compact negotiation
3 team. I have also served on the Commission's Power Plant and Line Siting Committee.
4

5 **Q. Have you previously testified before the Commission?**

6 A. Yes, I have provided testimony in a number of Commission proceedings on issues such
7 as regulatory policy, water utility acquisitions, utility financial issues, the System
8 Improvement Benefit ("SIB") mechanism, and other topics. Dockets where I have
9 testified or submitted written testimony include:

- 10 • Arizona Water Company's SIB proceeding (Docket No. W-01445A-11-0310);
- 11 • Global Water's last rate case (Docket Nos. W-01212A-12-0309 et al.);
- 12 • Arizona Water Company's Application to Extend its CC&N (Docket No. W-
13 01445A-03-0559);
- 14 • Global Water's sale of Willow Valley Water Company to EPCOR (Docket Nos.
15 W-01732A-15-0131 et al.); and
- 16 • Liberty Utilities (Bella Vista Water) Corp.'s and Liberty Utilities (Rio Rico
17 Water & Sewer) Corp.'s rate case (Docket Nos. W-02465A- 15-0367 et al.)

18 I have also given numerous presentations at regulatory workshops and industry meetings,
19 including presentations in the following Commission workshop proceedings:

- 20 • The generic water financing proceeding (Docket No. W-00000C-06-0149);
- 21 • The Notice of Inquiry Regarding the Cost of Equity for Class A, B, and C Water
22 and/or Wastewater Utilities (Docket No. W-00000A-08-0194); and
- 23 • Arizona Corporation Commission Investigation into Potential Improvements to its
24 Water Policies (Docket No. W-00000C-16-0151)

1 **Q. Please describe ConservAmerica.**

2 A. ConservAmerica was originally established as “Republicans for Environmental
3 Protection” in 1995. ConservAmerica’s mission is to educate the public and elected
4 officials on conservative approaches to today’s environmental, energy, and conservation
5 challenges. We are Republicans, independents, and conservatives who accept the reality
6 of climate change and support market-based solutions to address the dire challenges
7 climate change has created; and will continue to create for our country, our planet, and
8 future generations.

9
10 **Q. And what has been your role with ConservAmerica?**

11 A. I met the primary funder, Mr. Trammell Crow, several years ago while I was working
12 predominantly for Wall Street firms. We met and discussed an organization he was
13 involved with called “Republicans for Environmental Protection” or REP. REP was
14 founded in 1995 by a group of conservative Republicans who wanted to convince the
15 Republican Party to continue its long history of environmental protection and
16 conservation.

17
18 I was asked to join the Board of Directors, an unpaid position, and I served on the board
19 until March of 2016 at which point Mr. Crow asked me to begin winding down my
20 company, Insight Consulting, and work with him full time on ConservAmerica’s staff.
21 My current role is the Executive Director of ConservAmerica; and I work with Mr. Crow
22 on many other issues including venture capital issues and Earth Day Texas which he
23 created and operates.

24
25
26
27

1 **Q. What has ConservAmerica achieved in its efforts?**

2 A. Bill Meadows, former President of The Wilderness Society, said, "Of all the groups
3 working to protect the Arctic National Wildlife Refuge, the most important is
4 ConservAmerica."

5
6 ConservAmerica was the only right-of-center organization that worked to pass the
7 Energy Independence and Security Act of 2007, which dramatically changed lighting
8 efficiency in the U.S. ConservAmerica was credited with obtaining the necessary
9 Republican votes to pass the Waxman-Markey climate bill in 2010. Rep. Chris Gibson
10 (R-NY) said, "Without ConservAmerica, there would be no Gibson Climate Resolution."

11
12 ConservAmerica was instrumental in passing the Sleeping Bear Dunes Wilderness Act of
13 2014 by working with the diverse stakeholders to build consensus and prove support to
14 Rep. Dan Benishek (R-MI), the author of the bill. The bill was the first wilderness bill
15 passed in more than five years.

16
17 Later in 2014, ConservAmerica was the pivotal organization in getting several more
18 wilderness bills to the House floor for a vote.

19
20 In 2015, ConservAmerica worked with Arizona Corporation Commissioner Tom Forese,
21 the Arizona Association of School Business Officials, Governor Ducey's office, and
22 Arizona Public Service to develop the School Energy Efficiency pilot program which
23 assists financially challenged schools by providing energy efficiency investments and
24 passes 100 percent of the cost savings to the classroom.

1 We are very active in the effort to grow the signatories to the Gibson Resolution, and
2 advise a diverse coalition of groups working to seek common ground on climate, energy,
3 public lands, and other environmental policy.

4
5 We continue to support climate realist Republican candidates in their elections to both
6 public utilities commissions and to Congress.

7
8 **Q. Has ConservAmerica received any financial contributions from Arizona Public**
9 **Service or Pinnacle West?**

10 A. No.

11
12 **Q. Have ConservAmerica and APS worked together in the past?**

13 A. In 2015, ConservAmerica hosted an event in Dallas, Texas at which energy issues were
14 discussed. Mr. Jeff Guldner presented at that event. In 2016, in cooperation with Future
15 500, ConservAmerica hosted a panel discussion at Earth Day Texas in Dallas; the panel
16 discussed "Blue Collar Solar" and APS had a panelist. I apologize, I do not recall his
17 name. In 2016, ConservAmerica produced a video called "Blue Collar Solar" and APS
18 allowed Mr. Guldner to appear in the video to explain APS' Solar Partners Program.
19 Finally, and also in 2016, ConservAmerica published a white paper entitled "Keeping
20 The Lights On – Understanding and Securing the North American Electric Grid." APS
21 provided technical review assistance – they neither authored nor co-authored the paper,
22 but they did provide us with expert peer review.

23
24 **Q. Did APS or Pinnacle West provide any financial support, contributions, donations,**
25 **or payment for any of those activities?**

26 A. No.

1 **Q. Has ConservAmerica received any financial contributions from any utility or utility**
2 **trade group?**

3 A. No.
4

5 **Q. Can you provide an overview of your testimony?**

6 A. As I explained earlier, our mission is to educate the public and elected officials on
7 conservative approaches to today's environmental, energy, and conservation challenges.
8 While we continue to discuss, propose, and collaborate with people on Capitol Hill, it is
9 clearly the case that the vast majority of U.S. energy policy (and virtually all water
10 policy) is being made at the public utility commission level. PUCs are the ones
11 establishing renewable portfolio standards, devising and approving energy efficiency
12 programs, and perforce, are the ones dealing with the consequences, complexities, and
13 trade-offs of a rapidly changing utility landscape.
14

15 ConservAmerica intervened in this case to support the continuation of APS's Solar
16 Partners Program, and to encourage the Commission to approve APS's proposed change
17 to rate design. This case is vitally important because Arizona has the opportunity to set
18 the precedent for America's energy future. This testimony will address the Solar Partners
19 Program, while my rate design testimony will address demand charges.
20

21 **Q. How is your testimony organized?**

22 A. After this introduction, I will describe how rooftop solar is one of many important
23 technologies that we must expand to meet the challenge of climate change. I will then
24 describe the stark difference in solar penetration by income. Next, I show how all
25 Arizonans pay for solar through government subsidies, renewable energy surcharges and
26 cost shifts. Thus, lower income Arizonans end up footing the bill for the subsidized solar
27

1 provided to wealthier Arizonans. I then describe APS's Solar Partners Program and how
2 it can begin to provide solar in a fairer way that benefits all Arizonans.

3
4 **II. The importance of rooftop solar, clarifying its role in reducing emissions of GHGs.**

5
6 **Q. Why is rooftop solar important?**

7 A. Rooftop solar is an incredibly important tool in addressing climate change. There is no
8 question about that – rooftop solar has the potential to dramatically reduce emissions of
9 greenhouse gases (GHGs). The Economist, in “Curbing Climate Change: The Deepest
10 Cuts”, published in September of 2014, found that renewable energy policies and
11 investments worldwide have reduced GHG emissions by approximately 600 million tons.
12 Now, all numbers require context, so it must be noted that the same article pointed out
13 that nuclear power has reduced GHG emissions by 2.2 billion tons and energy/vehicle
14 efficiency has reduced GHG emissions by 10.03 billion tons.¹

15
16 So, clearly, renewables are not the “silver bullet” for stopping or avoiding climate
17 change. We need to do many things, all at once, if we are going to leave future
18 generations with a habitable and economically vibrant world. A friend of mine, Chip
19 Comins, the Chairman and CEO of The American Renewable Energy Institute, coined
20 the best term for what we need; not a silver bullet, but silver buckshot. It will take a lot
21 of different approaches to deal with climate change and, vitally, to create an American
22 economy that continues to grow. And in that regard, renewables matter a great deal.

23
24
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¹ Attached as Exhibit 1.

1 **Q. Please place the emergence of rooftop solar into context, can you clarify its role in**
2 **reducing emissions of GHGs?**

3 A. ConservAmerica believes that we are only at the beginning of the energy revolution.
4 Thomas Friedman is mostly right when he says there are three forces shaping the world:
5 The Market, Mother Nature, and Moore's Law.² All three of those forces are impacting
6 the others and creating changes in the others. Moore's Law will continue to drive
7 globalization, the market will rely on technology to adapt to (and speed) globalization,
8 and Mother Nature will continue to react with chemistry, physics, and biology to what
9 those other two forces create; and they, in turn, will have to deal with the results of the
10 laws of those three sciences.

11
12 Rooftop solar is only the most visible of the changes we expect to see in the utility
13 world—solar rooftops, storage, hybrid vehicles, the Internet of Things, and countless
14 other innovations exist today and will increasingly define our future. ConservAmerica
15 believes that future is inevitable—but how we get there will matter a great deal to our
16 environment, our economy, and our society.

17
18 **Q. Is rooftop solar the only significant type of carbon-free power?**

19 A. Not at all. I have already noted that nuclear power currently provides far more energy
20 than solar. Hydropower is an important legacy source of carbon-free power, and wind is
21 a rapidly-growing source. Even in the solar area, utility-scale and community solar are
22 important and cost effective. According to the Solar Energy Industries Association
23 ("SEIA"), "Utility-scale solar has represented nearly two thirds of the market over the
24 past few years, and this trend will likely continue through 2017 with a contracted pipeline
25

26
27 ² I would add the clash of civilizations to his list, but he probably thinks the market is driving that
through the Internet and globalized trade.

1 of projects totaling more than 20 gigawatts.”³ My point is not that rooftop solar is a
2 panacea or the answer to all our energy problems. It is simply one of many approaches
3 that we must pursue simultaneously.
4

5 **III. Reverse Robin Hood: How income inequality plagues rooftop solar deployment in**
6 **the U.S. and in Arizona.**
7

8 **Q. Is there a problem with how rooftop solar has been deployed?**

9 A. Yes. Rooftop solar has been deployed in a fundamentally unequal manner. I was in
10 complete agreement with Commissioner Bob Stump’s line of inquiry during the
11 December 20, 2016 Open Meeting in the Value and Cost of Solar docket: Commissioner
12 Stump correctly focused on the cost shift issue between high-income to low-income
13 households and we will address that in greater detail in the rate design portion of this
14 case.
15

16 There is, however, another problem with the social inequity of the current approach to
17 rooftop solar.
18

19 We remain concerned with the social inequity of rooftop solar adoption—all Americans
20 contribute financially (through state and federal taxes, and/or through utility surcharges)
21 to the programs and agencies that subsidize rooftop solar. And yet, 95 percent of rooftop
22 solar installations have gone onto the rooftops of the wealthiest 60 percent of U.S.
23 households.⁴
24
25

26 ³ <http://www.seia.org/research-resources/solar-industry-data> (visited December 12, 2012).

27 ⁴ See paragraph 3 below for source.

To really understand the scope of the social inequity, you have to understand the facts:

1. The median household income in America in 2015 was \$55,775. In Arizona, it was \$51,492.⁵
2. Low to Moderate Income Consumers represent 60 percent of U.S. households, “Low to Moderate Income” is defined as those earning up to 120 percent of area median income.⁶
3. “The 49.1 million households that earn less than \$40,000 of income per year make up 40 percent of all U.S. households but only account for less than five percent of solar installations.”⁷

Q. What about the “Solar Power to the People” study issued by the Center for American Progress?

A. This “study” is deeply flawed. But even this “study”, funded and published by the solar industry, found that rooftop solar is “mostly being deployed in neighborhoods where median income ranges from \$40,000 to \$90,000.”⁸ Notably, in Arizona median income is \$51,492,⁹ and the median for a one earner family is \$44,459.¹⁰ This confirms that poor and moderate income Arizonans are being excluded from rooftop solar.

⁵ <http://www.deptofnumbers.com/income/arizona/>.

⁶ Interstate Renewable Energy Council, “Bringing Shared Renewables to Low-Moderate- Income Consumers”, <http://www.irecusa.org/2016/03/how-to-bring-shared-renewables-to-low-moderate-income-consumers/>.

⁷ The George Washington University, “Bridging The Solar Income Gap”, January 2015, Page 2, <http://solar.gwu.edu/sites/default/files/GWSI-Bridging%20the%20Solar%20Income%20Gap%20Working%20Paper.pdf>.

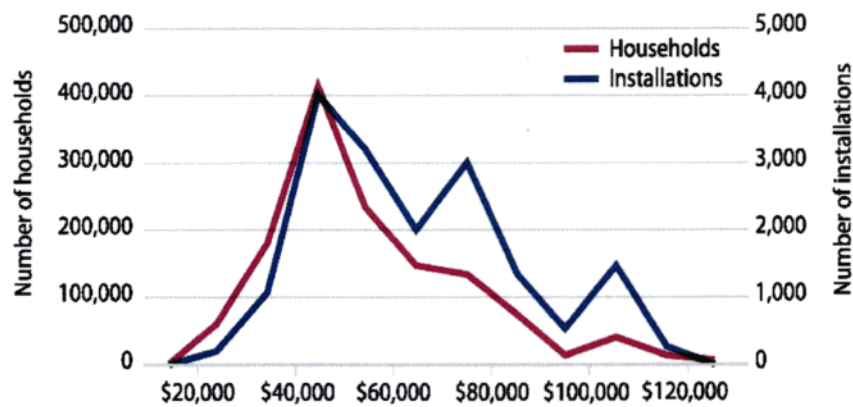
⁸ Center for American Progress, “Solar Power to the People”, October 21, 2013, throughout, <https://www.americanprogress.org/issues/green/reports/2013/10/21/76013/solar-power-to-the-people-the-rise-of-rooftop-solar-among-the-middle-class/>.

⁹ <http://www.deptofnumbers.com/income/arizona/>.

¹⁰ U.S. Dept. of Justice, Median Family Income by Family Size, https://www.justice.gov/ust/eo/bapcpa/20150401/bci_data/median_income_table.htm.

FIGURE 2

APS installations and households by income level



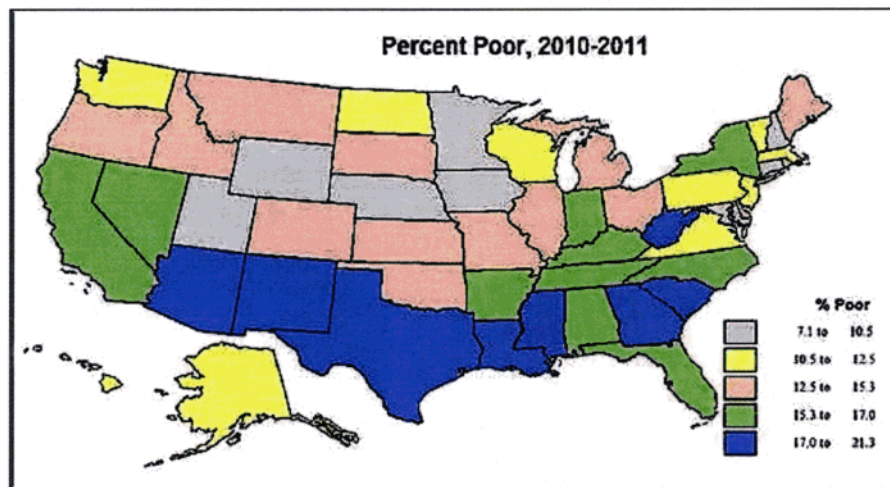
As you can see from the graphic above, from their report, in APS’s service territory, there is no social equity in accessing the benefits of rooftop solar—despite the fact that everyone pays—whether through utility surcharges or taxes, or both. In all households earning under \$40,000, installations lag; in all households earning over \$40,000 installations lead. And the biggest gaps occur once their study looks at household incomes over 110 percent of the median household income in Arizona.

Q. Do you have any concerns with this study?

A. I have several concerns. First and foremost, they make a big deal out of “finding” that “the areas that experienced the most growth from 2011 to 2012 had median incomes ranging from \$40,000 to \$50,000”. The study was based on zip codes—and they did not state that that income range had the most installations, only that it had “the most growth”. Further, there can be a large range of incomes in a zip code—“many rich households are “diluted” in impact because the zip codes are more variable in income.”¹¹

¹¹ NewGeography, “Rich, Poor, and Unequal Zip Codes”, Richard Morrill, January 30, 2014, <http://www.newgeography.com/content/004154-rich-poor-and-unequal-zip-codes>.

Income inequality is a major issue in Arizona, a study by the Economic Policy Institute found that between 2009 and 2011 the share of the total gain in income growth by the top 1 percent of Arizona households was 686 percent higher than the bottom 99 percent.¹² Furthermore, as the graphic below from that study demonstrates, Arizona continues to have one of the highest levels of poverty in the nation¹³:



Second, even the solar group's analysis finds that the highest growth level is for incomes ranging from 78 percent to 175 percent of the median household income in Arizona. As much as some (but not all) solar companies want to continue "business as usual" – this isn't sustainable, politically or economically. Ninety-five percent of rooftop solar installations in the U.S. have gone onto the homes of the wealthiest 60 percent of Americans. Income inequality is a problem in Arizona, poverty is a problem in Arizona; and yet, we continue to have a policy that restricts access to a massively subsidized

¹² Economic Policy Institute, "The Increasingly Unequal States of America", Sommeler, E. and Price, M. (2014, February 19), <http://www.epi.org/publication/unequal-states/>.

¹³ NewGeography, "The Emerging Geography of Inequality", Richard Morrill, 09/04/2013 <http://www.newgeography.com/content/003912-the-emerging-geography-inequality>.

energy opportunity. And, inexplicably, some (but not all) solar companies want to continue with business as usual.

Q. Please provide more detail on the inequality of rooftop solar.

A. Low income and blue collar neighborhoods have been left behind. In an article looking directly at rooftop solar penetration levels in Arizona, The Arizona Republic found that in the 85396 zip code, which covers Verrado, which has about 12,200 residents, there were 988 rooftop solar panels, the average household income in Verrado was about \$85,000. In the 85383 zip code in Peoria near Lake Pleasant, had over 1,200 installations for 37,000 residents; the average household income was more than \$120,000. By way of contrast, the 85040 zip code in south Phoenix had 45 installations in an area with more than 29,000 residents; the average annual income was \$41,000.¹⁴

Q. What are the causes of this inequality?

A. An outright purchase of a rooftop solar system requires a large upfront investment, beyond the means of many. The prevalent solar leasing model avoids this problem, but the leasing companies have strict credit requirements that exclude many; and of course, the customer also has to make the lease payments.

Q. Why is this inequality a problem?

A. First and foremost, it is not fair—having a program that all households contribute to funding, but only the wealthiest can participate in, violates any notion of fairness or social equity. And leaving behind the poorest 40% of Arizonans will sharply limit the deployment of rooftop sola—we need to find a way to include these customers in the

¹⁴ Randazzo, R. (2013, July 29). Costs of rooftop solar out of reach for many in Arizona. *The Arizona Republic*, <http://archive.azcentral.com/business/consumer/articles/20130726arizona-solar-costs-high.html>.

1 solar opportunity—beyond the social equity argument, the grid will benefit if we deploy
2 rooftop solar more broadly, having the largest concentrations of rooftop solar in certain
3 neighborhoods, but not others, reduces rooftop solar’s potential to strengthen the grid.

4
5 Further, the subsidies and renewable requirements that have driven rooftop solar adoption
6 are unlikely to be politically sustainable in the long term unless it is deployed in a fairer
7 way. Put more bluntly, there is strong support for solar in the abstract, but few voters
8 will support their hard earned dollars disproportionately going to reduce the power bills
9 of our wealthy neighborhoods, while they and their neighbors are left behind. If we are
10 to achieve a truly mass deployment of rooftop solar, a more equal approach is needed.

11
12 **Q. Has America dealt with a similar challenge in the past?**

13 **A.** It has. In the 1930s, electric service was constrained to cities and to wealthy farms.
14 “[T]he 1930 Census showed that only one tenth of American farms had central station
15 service.”¹⁵ That penetration rate is eerily similar to today’s level for rooftop solar
16 installations on households of low to moderate incomes, where only 5 percent of the
17 households that hold 40 percent of Americans have access to rooftop solar. But it’s
18 worse today than it was back then, because today’s social inequity was funded by the tax
19 and rate contributions of all households, even those of low to moderate incomes.

20
21 For those who like their history lessons to be more current, I would offer the 2015
22 Federal Communications Commission’s “ConnectAmerica Fund” which provided “\$1.5
23 billion in annual support broadband to nearly 7.3 million consumers in 45 states”.¹⁶ The
24

25 ¹⁵ Cooke, Morris L., “Electrifying the Countryside”, Survey Associates, Inc. (1935).

26 ¹⁶ Matthey, C. “A Milestone in Expanding Broadband to Rural America”, Wireline Competition
27 Bureau, August 28, 2015, <https://www.fcc.gov/news-events/blog/2015/08/28/milestone-expanding-broadband-rural-america>.

1 ConnectAmerica fund aims to close the digital divide in America—because it matters, in
2 terms of social equity, and in terms of economic opportunity.

3
4 Here, in Arizona, the Commission can take the first real step in America to democratize
5 rooftop solar by expanding on APS' Solar Partners Program—allowing APS to provide
6 the financing and the maintenance for third-party sold and installed systems on the homes
7 of blue collar households. Not only will this fuel the growth of locally-owned and
8 managed solar installation companies, it will begin closing the cost-shift spiral (which we
9 will address in greater detail in the rate design portion of this case), and it will ensure that
10 rooftop solar is more geographically dispersed so that it can better strengthen the grid.

11
12 **IV. Subsidies, renewable energy surcharges and cost-shifts: How those with the least are**
13 **footing the cost of solar subsidies.**

14
15 **Q. Who pays for rooftop solar?**

16 A. We all do, through taxes and tax subsidies, through state renewable bill charges, and
17 through ongoing cost shifts as rooftop customers avoid paying for the fixed costs of
18 providing service to them. If we all paid, and all received the benefits, there would be no
19 problem. And if we all paid, but the benefits were directed at low and moderate income
20 households, many could support that as well. Here, we have the opposite situation, we all
21 pay, but the wealthiest 60 percent get 95 percent of the benefits.

22
23 **Q. But aren't all energy sources subsidized?**

24 A. Yes, but not to the same extent, nor in the same unequal way. The topic of subsidies is
25 worth exploring. The U.S. Energy Information Administration, published an analysis
26 titled, "Total energy subsidies decline since 2010, with changes in support across all fuel
27

types” on March 13, 2015.¹⁷ ¹⁸ That analysis looked at “energy-specific subsidies and support by type, fiscal years 2010 and 2013”. It found wind subsidies were “\$5.5 billion in 2010 to \$5.9 billion in 2013. However, solar subsidies increased the most, both in absolute and percentage terms, going from \$1.1 billion to \$5.3 billion in 2013, with declining solar costs and state-level policies also supporting additional growth.”¹⁹

Q. But other sources, like nuclear, natural gas, and coal receive subsidies too?

A. Yes they do. The same report by EIA found that coal, natural gas, and petroleum liquids received about \$3.5 billion in 2013, down from \$4 billion in 2010. And nuclear received about \$1.69 billion in 2013, down from around \$1.9 billion in 2010.

Q. So solar receives more subsidies than nuclear, natural gas, coal, and other petroleum liquids, combined?

A. Yes, but it’s much worse than that: The last assessment of total federal subsidies was published by the Department of Energy in 2013, it found \$29.3 billion was flowing to energy subsidies through direct payments, tax credits, and loan guarantees. Of that total, only \$1.96 billion went to conservation programs—which benefit all customers by reducing total energy demand.²⁰

1. In 2013, \$8.63 billion went to direct expenditures by the federal government for renewables; \$5.45 billion went to tax credits, \$1 billion went to research and development, and \$8.6 billion went through ARRA.

2. By way of comparison, nuclear received \$1.69 billion; coal received \$1.2 billion, and natural gas and petroleum received \$2.35 billion.

¹⁷ <http://www.eia.gov/todayinenergy/detail.php?id=20352>.

¹⁸ Exhibit 2.

¹⁹ Ibid, Page 2, final paragraph.

²⁰ U.S. Department of Energy, Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2013, published March 2015.

3. For those subsidies, whether direct expenditures, tax credits, R&D, or ARRA; in 2015 this was the fuel source mix for U.S. electricity:

- a. Coal = 33 percent
- b. Natural gas = 33 percent
- c. Nuclear = 20 percent
- d. Hydropower = 6 percent
- e. Renewables:
 - i. Wind = 4.7 percent
 - ii. Biomass = 1.6 percent
 - iii. Solar = 0.6 percent
 - iv. Geothermal = 0.4 percent
- f. Petroleum = 1 percent
- g. Other gases = 1 percent

We are spending more money on subsidies for a source that provides 0.6 percent of our power needs than on the sources that provide 86 percent of our power needs.

Q. And who pays for those subsidies?

A. We all do. Everyone in America contributes money to the federal government, whether through income taxes or the taxes we inherently pay to corporations when we purchase their products and services. The problem with rooftop solar is that while every American contributes to the massive subsidies that fuel its growth, only the wealthiest benefit.

Q. You also mentioned renewable energy surcharges. Who pays for them?

A. Other than those in APS's and other Electric Utilities' Low Income Assistance Plans, every residential customer and most business customers of an Arizona Investor-Owned Utilities or Cooperatives is forced to pay a surcharge to "incent" renewable energy. And

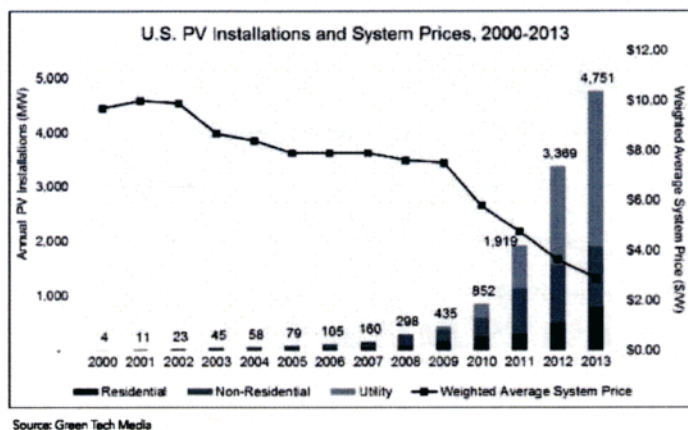
yet, while low and moderate income Arizonans contribute through taxes and bill surcharges, they lack access to the “incented” product.

Q. You also mentioned a cost shift. Please explain.

A. I will address this topic in more detail in my rate design testimony. But briefly, fixed costs are currently recovered primarily through volumetric kWh charges. Rooftop solar customers end up with few or no billed kWh, so they receive a small bill that contributes little to the fixed costs of the system. Those costs are thus shifted to non-solar customers, who are, as we have seen, disproportionately low and moderate income. The Commission’s decision in the Value and Cost of Solar docket will begin to end that cost-shift by ending net metering, but more remains to be done.

Q. What is happening to the grid as a result of increasing Distributed Energy Resources (“DERs”)?

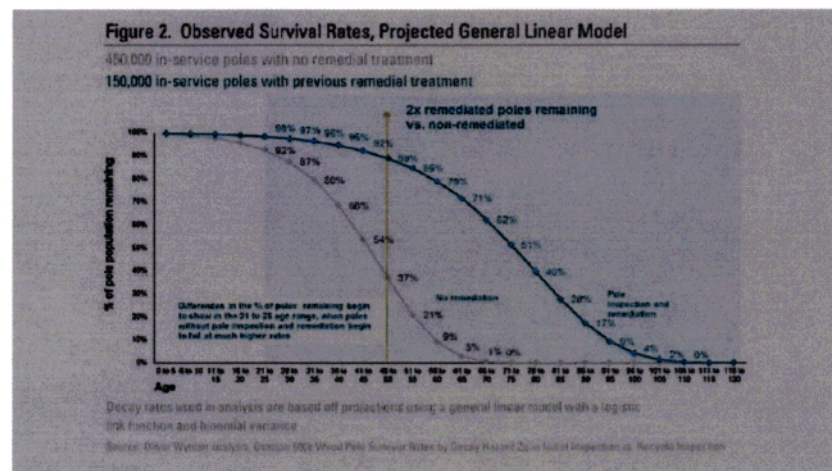
A. The grid is being changed by the increase in rooftop solar. Solar panels have seen a price fall of 70 percent during a time period in which public utility commissions expanded programs requiring utilities to emplace more solar into their generation mix, as this graphic from a recent ConservAmerica report clearly shows.²¹



²¹ “Keeping The Lights On”, ConservAmerica, Page 7.

This increase in rooftop solar results in a couple significant changes: First, it is being replaced predominantly on the larger, wealthier homes—which is reducing their financial contribution to utility required revenues. Those costs are already being shifted to non-solar homes. As APS makes clear in its testimony, the proposed rate increase on residential customers is 1.25% higher solely because of the cost shift from solar residential and commercial customers to non-solar residential and commercial customers combined and that cost-shift already totals \$42.7 million annually.²²

Second, it is changing the function of the distribution system. Power is now flowing onto the distribution system from homes and businesses, which has not occurred in the past. The distribution system in America is generally the oldest component of the grid. Ninety-two percent of the 450,000 in-service poles with no remedial treatments are over 26 years old.



Those two changes mean that costs of maintaining the grid are increasingly being shifted to non-solar homes from the wealthier solar homes; and that the costs of dealing with those new distribution-level power flows will have to be addressed if we want to keep the grid functioning. We will address this in greater detail in the rate design portion of this

²² Application of APS, Page 10, Lines 7-19.

case, but I highlight it here to emphasize that the undemocratic approach we have taken creates a grave social inequity.

V. Democratizing the Solar Opportunity: APS's Solar Partners Program.

Q. What is APS's Solar Partners Program?

A. It is a utility-based rooftop solar program. APS contracts with local installers to add rooftop solar to premises of APS customers. APS is seeking to include its investment in the Solar Partners Program in rate base.

Q. Do the customers in the Solar Partners Program have to make lease payments?

A. No. Customers are not obligated on a long-term lease, nor are they responsible for any up-front payment. Instead, customers receive \$30 month (\$360/year) off of their regular bill. APS's investment would be recovered through including its rooftop solar investments in rate base, as is done with APS's other generation investments.

Q. How is the Solar Partners Program targeted?

A. According to APS, the Solar Partners Program is for "qualified homes with a westerly-facing roof, in peak usage areas and a limited area of south-facing roofs will qualify in targeted areas."²³

Q. Would you like to see that targeting expanded?

A. I would like to see it expanded by allowing APS to dramatically increase the size of the program. I think what APS has done, starting in Flagstaff and expanded to Phoenix is this: they have built a conservative approach to rooftop solar. They are studying it,

²³ <https://www.aps.com/en/ourcompany/aboutus/investmentinrenewableenergy/Pages/solar-partner.aspx?src=solarpartner> (visited December 12, 2012).

1 emplacing it into neighborhoods with certain characteristics, to study the effect on the
2 grid. That was a wise and conservative approach. What is needed now is for the
3 Commission to allow APS (and all other Arizona electric utilities) to expand blue collar
4 solar programs and provide an equal opportunity for low to middle income households.
5 They have paid taxes and surcharges for 15 years, and yet they still are frozen out by
6 costs and leasing models that are not economical or affordable to them. In the Value and
7 Cost of Solar Open Meeting, I heard mention that the total subsidy to date in Arizona is
8 around \$1.5 billion. In an ideal world, the Commission would work with APS and other
9 electric utilities to return that subsidy to low to moderate income households through
10 utility owned rooftop solar. We are in the midst of a great social inequity, it is taxation of
11 all for a subsidy and a product that only the wealthiest can afford.

12
13 **Q. Why should the Commission approve the continuation of APS's Solar Partners**
14 **Program?**

15 A. APS's Solar Partners Program is a vital step in ensuring that rooftop solar becomes
16 available to many more Arizonans—this increases the social equity and it should also
17 strengthen the grid by spreading the distributed energy resource more widely throughout
18 the service territory of APS. APS's Solar Partners Program embodies what
19 ConservAmerica calls "Blue Collar Solar". It addresses a growing challenge: how do
20 democratize rooftop solar?

21
22 **Q. How can we democratize rooftop solar?**

23 A. ConservAmerica strongly believes that PUCs should adopt what we call "Blue Collar
24 Solar" programs—programs like APS's Solar Partners Program and Tucson Electric
25 Power's "TORS" program. Under these programs, utility customers can receive the
26 benefits of rooftop solar (reduced bills and knowing they are contributing to a lower
27 emissions future) without the upfront costs of solar and without having to qualify for a

1 solar lease—or encumber their home with a solar lease, which Arizona State University
2 found decreases homes resale values.²⁴

3
4 **Q. How are low-income and blue collar households impacted by current rooftop solar**
5 **policies?**

6 A. They are essentially left picking up the check as wealthier households. Blue collar
7 families are funding the very changes that increase their own utility bills while the
8 wealthier homes move away from paying their fair share of the costs. I will address the
9 cost shift spiral in my rate design testimony. But in short, blue collar households are
10 being left behind. Unless we increase the use of Blue Collar Solar programs like APS's
11 Solar Partners Program, we will continue to leave blue collar households out of the
12 rooftop solar approach.

13
14 **Q. Do you think there is truth to the claim that blue collar solar programs, like APS'**
15 **Solar Partners Program, will “kill” solar?**

16 A. No. First of all, there is nothing new under the sun—and in his seminal work “Principles
17 of Public Utility Ratemaking”, James Bonbright warned of “the certainty that
18 exaggerated claims of community benefits [and impacts] will be put forward by pressure
19 groups.”²⁵ So, when the Commission hears, once again, that any change to any existing
20 subsidy, and any change to the current market, will “kill solar”; it should rest easy in
21 knowing that the refrains of death and destruction are overwrought and intended merely
22 to defer action in the face of evidence.

23
24
25 ²⁴ Randazzo, R. and Reagor, C. (2015, July 17). Solar can raise home values – if you own the
26 system. *The Arizona Republic*, <http://www.azcentral.com/story/money/real-estate/2015/07/17/solar-raise-home-values-system/30296123/>.

27 ²⁵ Principles of Public Utility Ratemaking, James Bonbright, Part One, Chapter VII, “The Meaning
of So-Called Social Principles of Rate Making” section.

1 Second, APS doesn't own any of the installer companies. Pinnacle West doesn't own
2 any of them either—those are wholly unaffiliated companies that are far more likely to be
3 locally-owned and managed than companies like Solar City and SunRun which are
4 clearly not Arizona-based or managed. Expanding the Solar Partners Program will not
5 “kill solar”, to the contrary, it will expand solar, providing access to rooftop solar to low
6 and moderate income Arizonans while promoting local jobs with the local companies that
7 install these systems.
8

9 **Q. Will expansion of APS' Solar Partners Program “kill” the solar industry?**

10 A. No. The rooftop solar industry has been “juiced” with incentives for years²⁶—and while
11 increasing solar is a good thing for the environment, continuing the same approach,
12 wherein 95 percent of the opportunity goes to the wealthiest while everyone is forced to
13 contribute will only exacerbate the social inequity. It is also seriously disruptive to rates,
14 which we will address in the rate design portion of this case. If the Commission does
15 what we believe it should—expand the opportunity for every Arizonan to participate in
16 rooftop solar we will not kill the solar industry, we will watch it grow dramatically. If the
17 Commission acts on Chairman Little's idea to double the renewable energy standard to
18 30 percent, and the Commission dramatically expands rooftop solar, Arizona will not
19 simply be what it already is, one of the nation's highest solar-producing states, it will be
20 the first state in America to democratize rooftop solar.
21

22 **Q. What do you believe should happen with APS' Solar Partners Program?**

23 A. Rooftop solar should be expanded in scope, and in availability. The Arizona Corporation
24 Commission will consider both those aspects in this case; and ConservAmerica supports
25

26 ²⁶ Recall, the study in Footnote 17, above: “However, solar subsidies increased the most, both in
27 absolute and percentage terms, going from \$1.1 billion to \$5.3 billion in 2013, with declining solar
costs and state-level policies also supporting additional growth.”

1 increasing the Renewable Energy Standard (REST) so long as it also includes
2 rationalizing the implementation plans: There are too many ‘carve-outs’ and ‘set-asides’
3 in Arizona’s REST; and there is too little effort, attention, and funding for what we call
4 “Blue Collar Solar” programs — programs which not only incent, but require utilities to
5 use third-party solar installers to emplace solar systems on the rooftops of middle and
6 low-income customers.

7
8 ConservAmerica supports APS’ Solar Partners Program, which has already installed 10
9 megawatts of rooftop solar on approximately 1,600 homes at targeted locations... [And
10 APS] is exploring how to optimize the grid and increase reliability for the long-term
11 benefit of all customers.”²⁷

12
13 The Solar Partners Program presents Arizona with the best way to address the reality of
14 the inequitable distribution of rooftop solar.

15
16 **VI. Summary.**

17
18 **Q. So, if you had to summarize ConservAmerica’s position on rooftop solar, what**
19 **would you say it is?**

20 **A.** ConservAmerica believes in facts; it is simply a fact that anthropogenic climate change is
21 occurring. It is simply a fact that zero emissions energy sources need to be dramatically
22 expanded and emplaced. It is simply a fact that “there is no such thing as a free lunch”—
23 distributed energy resources come with benefits, and costs—and the costs of DERs need
24 to be borne by those who create the costs and by those who can most afford to bear those
25 costs. It is simply a fact that 95 percent of rooftop solar installations are on the homes of
26 the wealthiest 60 percent of Americans. It is simply a fact that low- and middle- income

27 ²⁷ Application, APS Direct Testimony summary, page 16.

1 households are left out, but still required to pay for rooftop solar through taxes and utility
2 surcharges. It is simply a fact that utility-financed, third-party installed, rooftop solar on
3 blue collar homes is better for social equity, the grid, and reducing the cost-shift spiral.
4

5 **Q. Please summarize your testimony.**

6 A. The social inequity of that reality cannot be allowed to continue—it is simply
7 indefensible to collect surcharges and taxes from all Americans to provide benefits only
8 to the wealthiest among us.
9

10 Furthermore, the emplacement of rooftop solar on higher-income households reduces one
11 of the primary benefits of distributed power generation—it will work better for the grid if
12 it is emplaced throughout the grid and not simply in the wealthiest neighborhoods.
13

14 Accordingly, the Commission should encourage APS to expand the Solar Partners
15 Program, and the current Solar Partners Program investments should be included in rate
16 base.
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Exhibit 1

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Our guide to the actions that have done the most to slow global warming

Sep 20th 2014

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ON SEPTEMBER 23rd 120-odd presidents and prime ministers will gather in New York for a UN meeting on climate change. It is the first time the subject has brought so many leaders together since the ill-fated Copenhagen summit of 2009. Now, as then, they will assert that reining in global warming is a political priority. Some may commit their governments to policies aimed at reducing greenhouse-gas emissions. What few will say is how many tonnes of carbon dioxide these will save—because they almost never do.

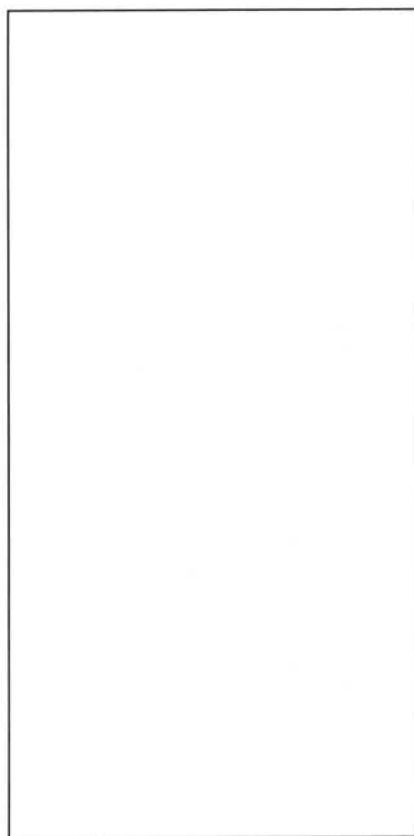
According to scientists, cutting carbon-dioxide emissions is an essential part of reducing catastrophic risks from climate change. Yet governments are persistently averse to providing estimates of how much carbon a policy saves. That may be because, in countries where climate change is controversial, it makes more sense to talk about the other benefits a scheme offers rather than its effect on carbon. Or it may be that, in countries which are enthusiastic about renewable energy, pointing out that it may not save that much carbon is seen as unhelpful. Or perhaps governments think climate change is so serious that all measures must be taken, regardless of cost (though their overall lacklustre record suggests this is not the case).

Whatever the reason, the end result is that while the world's governments have hundreds of policies for tackling climate change, some of them very expensive—China, America and the European Union spend \$140 billion a year on subsidising renewable energy—it is hard to say which policies are having the greatest effect.

So *The Economist* has made a stab at a global comparison of carbon-mitigation efforts. Chart 1 is the result. It ranks 20 policies and courses of action according to how much they have done to reduce the

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atmosphere's stock of greenhouse gases. We have used figures from governments, the EU and UN agencies. As far as we know, this exercise has not been carried out before.

To slash or to trim

Emission reductions by policies/actions, bn tonnes CO₂ equivalent

Policy/Action	Cumulative emissions	Period	Annual emissions*
Montreal protocol ¹	135.0bn	1989-2013	5.6bn
Hydropower worldwide ²	2.8bn	2010	2.8bn
Nuclear power worldwide ²	2.2bn	2010	2.2bn
China one-child policy ³	1.3bn	2005	1.3bn
Other renewables worldwide ²	600m	2010	600m
US vehicle emissions & fuel economy standards ⁴	6.0bn	2012-25	460m
Brazil forest preservation ⁵	3.2bn	2005-13	400m
India land-use change ⁶	177m	2007	177m
Clean Development Mechanism ⁷	1.5bn	2004-14	150m
US building & appliances codes ⁸	3.0bn	2008-30	136m
China SOE efficiency targets ⁹	1.9bn	2005-20	126m
Collapse of USSR ⁹	709m	1992-98	118m
Global Environment Facility ¹⁰	2.3bn	1991-2014	100m
EU energy efficiency ¹¹	230m	2008-12	58m
US vehicle emissions & fuel economy standards ¹⁴	270m	2014-18	54m
EU renewables ¹²	117m	2006-12	29m
US building codes (2013) ¹²	230m	2014-30	10m
US appliances (2013) ¹³	158m	2014-30	10m
Clean technology fund ¹⁵	1.7bn	project lifetime	na
EU vehicle emission standards ¹⁶	140m	2020	na

CATEGORIES:

Energy production
Transport
Other regulations
Global treaties
Land & forests
Other

See following panel for sources and explanations

*Annual emissions are cumulative emissions divided by the relevant period. The estimate for the current emissions avoided under the Montreal protocol is eight billion tonnes of CO₂e. The annual figure for the collapse of the USSR refers to the years 1992-98. ¹Cars and light trucks ²Heavy trucks

Apples, meet oranges

First, a health warning: the policies and actions on our list are not strictly comparable. Some are global, some regional and some national. Some are long-standing; some new. A couple are not policies at all, such as the collapse of the Soviet Union, which led to the closure of polluting factories and to inefficient state farms reverting to grassland, locking up carbon.

And the numbers almost all come with caveats. It is fairly easy to estimate how much carbon a new field full of solar cells or a nuclear-power plant saves by looking at the amount of electricity it produces in a year and how much carbon would have been emitted if fossil fuels had been used instead, based on the local mix of coal, gas and oil. But as Paul Joskow of the Massachusetts Institute of Technology has pointed out, the standard "levelised" calculations, which divide the total amount of power a plant will produce over its lifetime by its total lifetime cost, are a poor way to compare fossil fuels and renewable energy.

Other measures have problems, too. Take the effects of fuel-efficiency standards. Would companies have curtailed their cars' emissions anyway to sell more of them to cost- and mileage-conscious drivers? And how much has better fuel efficiency encouraged drivers to drive farther?

A further complication is that many policies have benefits beyond—or indeed closer to hand than—those they offer in terms of climate. Burning less coal saves lives in the near future as well as reducing climate risks in decades to come. Saving forests preserves wildlife, not just carbon.

So our table should be treated with caution. It is only safe to say that one policy is better than another in climate terms if it beats it by a wide margin.

As it happens, though, there are some very wide margins to be found. One policy stands head and shoulders above all others. And it is one that few people other than climate-



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policy specialists will have thought of in this context: the Montreal protocol, a 1987 agreement to phase out substances such as chlorofluorocarbons (CFCs) used in air conditioners, refrigerators and so on. It was enacted to limit the damage such substances were doing to the ozone layer, a goal which it has achieved.

Like carbon dioxide and many other gases emitted by industry and agriculture—methane and nitrous oxide, for example—CFCs are greenhouse gases. And they are extremely potent ones, causing thousands of times more warming per molecule than carbon dioxide does. That means stopping CFC production, which was in the range of millions of tonnes a year, delivered a climate benefit equivalent to cutting carbon-dioxide emissions by billions of tonnes.

Collateral benefits

Guus Velders of the Dutch National Institute for Public Health and the Environment has compared the warming effect that would have come about if the emissions of such chemicals had continued to grow at the rate they were growing before the protocol with what has come about thanks to their banning. The net effect is equivalent to that of a whopping 135 billion tonnes of carbon dioxide. That is more than twice today's total annual greenhouse-gas emissions, which are equivalent to about 50 billion tonnes of carbon dioxide (carbon dioxide itself makes up about three-quarters of that, with methane, nitrous oxide and some gases used in industry making up the rest). Durwood Zaelke of the Institute for Governance and Sustainable Development, a think-tank, says that if CFCs were uncontrolled the annual figure would be 8 billion tonnes higher. The Montreal protocol has had nearly as big an effect as all the rest of our list put together.

Trailing some way behind the Montreal protocol is a small group of measures—not really climate policies—that have been responsible for avoiding between 4% and 7% of greenhouse-gas emissions. According to the International Atomic Energy Agency, nuclear power avoided the production of 2.2 billion tonnes of carbon dioxide in 2010—that is, emissions would have been 2.2 billion tonnes higher if the same amount of electricity had been produced by non-nuclear plants. Energy from dams and other hydroelectric sources avoided 2.8 billion tonnes (though emissions of methane from the reservoirs behind some of those dams mean the net effects were less than that). Between them they generated 6,000 terawatt-hours of electricity in 2011, compared with 450TWhrs for wind and less than 60TWhrs for solar. The high rate at which new wind and solar capacity is being built will eat into this lead, but it will take some time to overturn it.

The other item in this group is something of a cheat. In 2007 Su Wei of China's foreign ministry said that his country's one-child policy, by reducing the number of births between the late 1970s and the mid-2000s by 300m, had reduced carbon emissions by 1.3 billion tonnes in 2005 (because there were fewer people to consume goods which generated greenhouse gases in their production). Taking this argument further, one could say that the fall in global fertility since 1960 cut emissions even more. That is not exactly a climate policy. But it is a reminder that greenhouse gases are powerfully influenced by factors far beyond the scope of climate-change policies.

Three other lessons emerge. First, policies to slow or reverse deforestation are more important than one might expect. Trees absorb carbon as they grow and release it when they are cut down. According to a recent study in *Science*, declining deforestation in Brazil meant that the country produced 3.2 billion tonnes less atmospheric carbon dioxide between 2005 and 2013 than it would have if the tree-felling had continued unabated. That is 400m tonnes a year. The slowdown in deforestation in tropical countries is one of the reasons that the conversion of forests to farmland now accounts for only 11% of greenhouse-gas emissions globally, much less than 20 years ago.

The other reason for deforestation's dramatically reduced share of total emissions, though, is that industrial emissions of carbon dioxide have continued to grow rapidly. The rise is not as fast as it might have been. Rules that make vehicles more efficient and improve the energy efficiency of buildings and appliances have done more than might be



expected. America has been setting standards for vehicle greenhouse-gas emissions and fuel efficiency since the mid 1970s; the current rules are forecast to reduce carbon-dioxide emissions by 6 billion tonnes in 2012-25, meaning by about 460m tonnes a year. America's Department of Transportation reckons that overall such rules have reduced carbon-dioxide emissions by a cumulative 14 billion tonnes. Europe's equivalent regulations for passenger cars and light trucks do less (European vehicles were more efficient to start with) but are still respectable; being adopted by overseas manufacturers who want to sell cars in Europe gives them an unquantified extra clout.

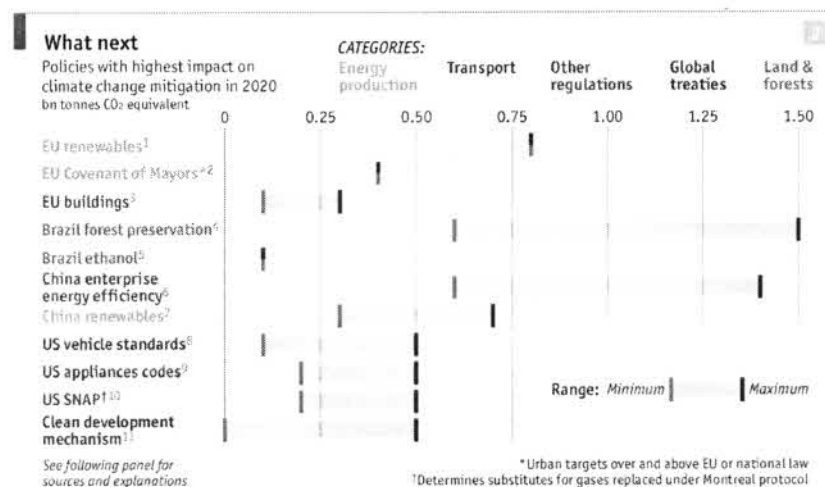
Their time will come

New EU rules on the design of boilers and water heaters are expected to save 136m tonnes of carbon dioxide a year within six years. China's Development Research Centre and the World Bank say that on the basis of 2010 figures energy-efficiency targets for Chinese state-owned enterprises save about the same amount; that scheme has recently been much expanded.

Subsidies for solar and wind power do less than you might expect, considering the attention they receive. The European Environment Agency calculates that between mid-2008 and 2012, what it calls changes in the carbon intensity of energy (mainly, the rise in renewables) accounted for a third of the decline in carbon-dioxide emissions in the EU. Emissions fell 350m tonnes in that period, so renewable policies seem to be responsible for about 30m fewer tonnes of carbon dioxide a year, making them less effective than energy-efficiency measures.

This estimate may be low. A separate calculation by Germany's environment ministry puts the figure for Germany alone at 100m tonnes in 2012. But even if the EU estimate is only half what it should be, renewables would still fall short of other carbon-mitigation policies. They are also extremely pricey. The cost of Germany's *Energiewende* (its transformation to a renewables-based electricity system) is €16 billion (\$21 billion) a year. The cost of helping developing countries phase out CFCs under the Montreal protocol was just \$2.4 billion all-told from 1990-2010. The Amazon Fund, which has done much to fight deforestation in Brazil, has mostly been funded by the Norwegian government at a cost of just \$760m over 11 years.

Over the next few years, the relative weights of all these policies will change. Nuclear energy is being phased out in Germany and may not recover to its pre-Fukushima heights in Japan. Although it is growing in China, its share of worldwide electricity generation—currently about a seventh—is likely to decline. The same may be true of hydropower. The share of solar and wind power, on the other hand, will rise as costs fall and capacity increases (installed capacity for these renewables doubled in 2012-14).



The Economist asked Climate Action Tracker, a group of scientists who study emissions policies and actions, to calculate the policies likely to have the biggest impact in 2020.

Their findings, in chart 2, suggest that the influence of the EU's renewables regime will grow considerably, though Europe will still be far from the zero-carbon energy system greens long for. Chinese efforts to boost renewables and energy efficiency are also likely to start bearing a lot more fruit. So, they think, could the UN's Clean Development Mechanism (CDM), which finances greenhouse-gas reduction measures in developing countries to offset emissions in rich ones.

Much more to do

These estimates work on the basis of current policies. But one possible new measure would make a big difference. Hydrofluorocarbons (HFCs) are ozone-friendly replacements for CFCs, and are one of the fastest-growing greenhouse gases, having risen 40% since 1990. Emissions of HFCs are unrestricted, though CDM investments are used to reduce them in some cases. If the Montreal protocol were quickly amended to include them, says Mr Zaelke, it might do almost as much for greenhouse-gas emissions in the next 35 years as it did in 1990-2010.

Saving the equivalent of some 130 billion tonnes of carbon dioxide so cheaply would be a big win. But it is still only a tenth of what would need to be done to ensure that the temperature in 2100 is no more than 2°C higher than it was at the time of the Industrial Revolution—the limit that the countries of the world have committed themselves to. Without the measures listed in chart 1 emissions might be equivalent to almost 70 billion tonnes of carbon dioxide a year, rather than 50 billion. But even the lower number is too high to meet the stated goal, and the overall trend is up, not down. World leaders gathering in New York are not only being vague about their climate policies. They are being dilatory, too.

Sources and explanations

Chart 1

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Chart 2

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* This article appeared in the Briefing section of the print edition

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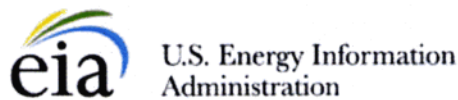
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Exhibit 2

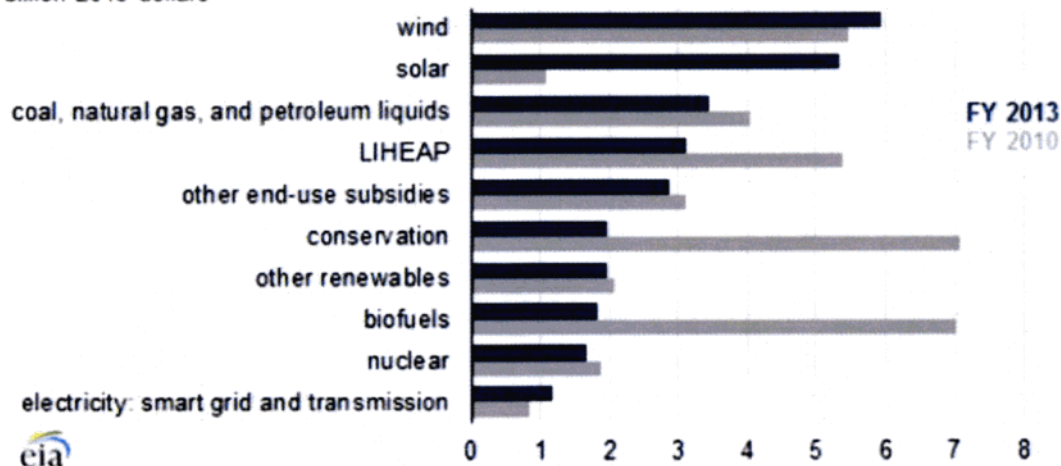


Today in Energy

March 13, 2015

Total energy subsidies decline since 2010, with changes in support across fuel types

Quantified energy-specific subsidies and support by type, fiscal years 2010 and 2013
billion 2013 dollars



Source: EIA, [Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2013](#)

Note: LIHEAP is the Low Income Home Energy Assistance Program.

EIA has updated a [report on federal subsidies to the energy industry](#), covering the 2013 fiscal year (FY). The most recent prior report reviewed subsidies in FY 2010, at or near the height of spending related to the American Recovery and Reinvestment Act of 2009 (more commonly known as the Recovery Act). Between FY 2010 and FY 2013, the total value of direct federal financial interventions and subsidies in energy markets decreased 23% from \$38.0 billion to \$29.3 billion dollars, reflecting changes in both the type of subsidies offered and fuels that received support.

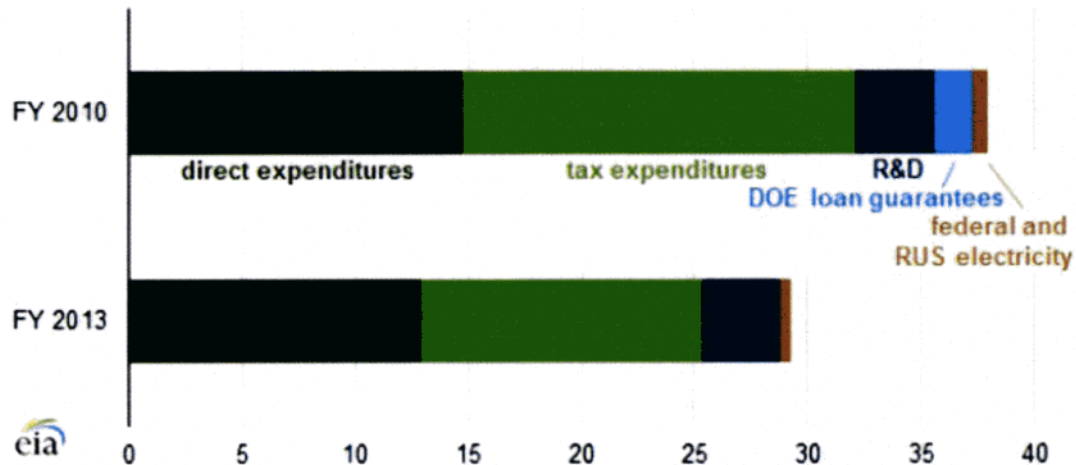
EIA's updated study focuses on direct federal financial interventions by the federal government that provide a financial benefit with an identifiable federal budget impact and are specifically targeted at energy markets.

Within this scope are:

- Direct expenditures (cash payments directly to market participants)
- Tax expenditures (reductions in tax payments)
- Investment in research and development (R&D)
- Financial support to federal power marketing administrations (PMAs)
- Credit subsidies to recipients of federal loan guarantees

Some programs that benefit energy markets are not included in the analysis as they have broader applicability beyond the energy industry. For instance, accelerated depreciation tax schedules and domestic manufacturing tax deductions apply to both the energy sector and other industries. Other programs, such as the renewable fuels standard and indemnification laws such as the Price-Anderson Act that limits the liability of nuclear plant operators are not included because they lack a distinguishable federal budget impact.

Quantified energy-specific subsidies and support by type, fiscal years 2010 and 2013
billion 2013 dollars



Source: EIA, *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2013*

Note: RUS is the U.S. Department of Agriculture's Rural Utilities Service.

Between FY 2010 and 2013, the share of tax expenditure in total financial interventions and subsidies declined from 46% to 42%, while the share of direct expenditures grew from 39% to 44%, reflecting a move from subsidies for renewable liquid fuels such as ethanol to subsidies for renewable electricity, particularly solar power. Since FY 2010, the government has eliminated the Volumetric Ethanol Excise Tax Credit (VEETC) for fuel ethanol, and biofuels' share of total renewable energy subsidies fell from 45% in FY 2010 to 12% in FY 2013.

Meanwhile, the government revised tax credits for a growing solar power industry, allowing subsidy applicants to receive grants in lieu of tax credits. These grants, known as Energy Investment Grants or Section 1603 grants for the tax provision in the Recovery Act that established them, were one of the few energy subsidy programs created by the Recovery Act that still had a substantial budgetary impact by FY 2013.

The Section 1603 grants increased nearly \$4 billion between FY 2010 and FY 2013, while electricity-related tax expenditures for renewables doubled from \$1.9 billion to \$3.8 billion. Electricity-related subsidies, primarily directed towards fuels and technologies used for electricity production, increased in both absolute and percentage terms between FY 2010 and FY 2013, reflecting increases in both direct expenditures and estimated tax subsidies. Wind subsidies increased by less than 10%, going from \$5.5 billion in 2010 to \$5.9 billion in 2013. However, solar subsidies increased the most, both in absolute and percentage terms, going from \$1.1 billion to \$5.3 billion in 2013, with declining solar costs and state-level policies also supporting additional growth.

With lower adoption of tax credits for home efficiency improvements and the declining need for the Low Income Home Energy Assistance Program with an improving economy, support for conservation and end-use programs was at \$7.9 billion in FY 2013, down from \$15.6 billion in FY 2010. Federal subsidy support for fossil fuels declined from almost \$4 billion in FY 2010 to \$3.4 billion in FY 2013. Within those fossil fuel subsidies, support for coal declined by less than 3%, but support for oil and natural gas declined by almost 20%.

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